

REMARKS

Applicant acknowledges the First Action of 28 FEB. 2005 and requests reconsideration of the application, as amended. In order to highlight the inventive concept, independent claims 1 and 9 have been amended to incorporate features of former claim 5, now cancelled. Claim 2, as amended, describes features shown in FIGS. 4 & 7. Substitute specification pages 3-4 are enclosed, to correct errors in some reference numerals.

A brief review of some significant features of the present invention may facilitate understanding of its differences from the prior art. As stated at specification page 5, lines 10-16, motors of this kind typically rely upon a rotor position sensor, which is secured to a bearing support tube (38) and must have a **predefined angular orientation** with respect to the stator (22). Thus, it is necessary to fix the angular orientation between support tube (38) and stator (22). Historically, this was done by providing a groove in the stator lamination stack, but this poses manufacturing and assembly issues. Secondly, in motors like this, one must keep the stator and the bearing support tube from **axially separating**, even when subjected to acceleration forces, which in automotive installations can often exceed 4 gravities!

The present invention avoids the need to groove the stator lamination stack, and performs **both** the anti-rotation function and the anti-axial-separation function, using the **same elements**, namely projecting portions 34' (FIG. 7)

cooperating with grooves on the outside (98) of the tube (38).

CLAIM REJECTION--SECTION 103

Claims 1-9 were rejected under section 103, as allegedly obvious over a combination of WROBEL/PAPST USP 5,170,086 with HARADA/NIPPON DENSAN USP 5,363,003.

According to WROBEL, it is necessary to provide an axial groove 31 on the stator (col. 4, lines 35-40, and FIG. 2) into which, after assembly, the axial cam 35 on tube 7 engages. This requires that, during assembly of the stator lamination stack 9, the individual laminations or plates be perfectly aligned with each other, so that groove 31 is continuously open along its extent, and is not interrupted or obstructed by incorrect rotational alignment of even a single lamination. Achieving such perfect alignment is a difficult task, especially when the motor and its parts are small or miniature.

According to HARADA, as shown in FIG. 1, it is similarly necessary to provide, on the inner surface of the stator lamination stack, a groove 27, into which a projection 25, on the outer surface of the bearing support tube 25, engages; see col. 3, lines 50-61. This has the **same disadvantage** as in WROBEL, namely that one must assemble the stator lamination stack *perfectly*; see col. 4, lines 21-25.

Page 4 of the Office Action suggested that HARADA's elastic pieces 14, cooperating with groove 16, were similar to the present invention. However, groove 16 is a **circumferential** groove, and thus does not provide anti-rotation functionality like the present invention.

HARADA does show some anti-rotation elements in FIGS. 11-13, namely grooves 141 on part 138 which cooperate with projecting strips 143 on part 114, as described at col. 6, line 60, through col. 7, line 2. However, these are not the same elements as those which keep his stator and bearing tube together.

In short, neither WROBEL nor HARADA teaches how to avoid the need to put a groove each of the stator laminations, nor does either of them teach how to provide **both** anti-rotation and anti-axial-separation functionality by the **same** elements. The present invention is thus a cost-saving innovation, which was not taught or suggested by the prior art.

A preferred way to produce the claimed structure is, as described in the specification, to dimension tabs 34, of annular disk 20, so that they extend radially inward to terminate at a radius **r1** from central axis 101 (see enclosed sketch) which is smaller than a radius **r2** of a corner of bearing support tube 38. Thus, when tube 38 is slid up into recess 36 of stator 22, it bends tabs 34 diagonally upward to form barbs 34' as shown in FIG. 7, and recited in amended claim 2. These diagonal barbs 34' thus dig into the coating on the outside surface 98 of bearing support tube 38, and thereby resist any forces tending to axially separate tube 38 from stator 22. Since these same tabs or barbs also engage in grooves on bearing tube 38, they also provide the anti-rotation function.


The assignee has furnished 2 samples of the invention to US counsel; one can be supplied to the PTO, upon request.

In view of the foregoing amendments and arguments,
it should be apparent that claims 1-9, as amended, patentably
distinguish over any combination of WROBEL, HARADA and the
other art of record. Passage of the application to allowance
is solicited.

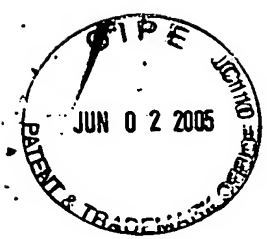
If the examiner notes any remaining informalities,
a telephone call to Applicant's counsel is invited.
No extension fee is believed necessary in connection with this
amendment but if any is required, please notify the
undersigned, and charge to Deposit Account 23-0442.

Respectfully submitted,

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Enclosures: explanatory sketch (marked-up FIG. 5)
for discussion purposes only
Substitute specification pages 3-4



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EXTERNAL ROTOR MOTOR
Pat. No. 870-003-166

EXPLANATORY SKETCH—FOR DISCUSSION PURPOSES ONLY

